

and Exposition

Hot Weather Concrete in Florida: The I4/Selmon Expressway Connector

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Project Information

- Florida Department of Transportation
- PCL/Archer Western
- Cemex
- March 2010 January 2014
- 100,000 CY
- Class VI 8500
- Slump 5.50 8.50
- W/C 0.31 or less

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Concrete Information

- Class VI 8500
- Slump 5.50 8.50
- W/C 0.31 or less
- 60 90 Minute Placement Times
- Concrete Temperature 100F or Less



FDOT Concrete Specification

346-7.5 Concreting in Hot Weather: Hot weather concreting is defined as the production, placing and curing of concrete when the concrete temperature at placing exceeds 85°F but is 100°F or less.

Unless the specified hot weather concreting measures are in effect, reject concrete exceeding 85°F at the time of placement. Regardless of special measures taken, reject concrete exceeding 100°F. Predict the concrete temperatures at placement time and implement hot weather measures to avoid production shutdown.



FDOT Concrete Production Facilities Guide

9.2.5 GENERAL INFORMATION

Concrete production facilities that supply concrete to Department projects must have a QC Plan accepted by the Department in accordance with **Specifications Section 105**. A list of concrete production facilities, herein after called plants, with accepted QC Plans that meet the requirements of this guide, will be maintained by the Department.

Concrete produced in accordance with *Specifications Section 346* and this guide shall be accepted with the proper certification and verification of job site acceptance criteria.



FDOT Concrete Production Facilities Guide

9.2.6.3.1 Wetting Coarse Aggregate Stockpiles, Storage Bins and Silos

The coarse aggregate shall be continuously and uniformly sprinkled with water for a period of 24 hours immediately preceding introduction into the concrete. Any request for deviations from the 24-hour sprinkling requirement shall be addressed in the Producer's QC Plan for consideration by the DMRE.



FDOT Concrete Production Facilities Guide

Make a separate submittal for each class of concrete and each particular combination of component materials to be used at a trial mix concrete temperature of 68°F to 86°F, for hot weather mixes at a minimum concrete temperature of 94°F or for hot weather concrete for extended transit time mixes. Slab replacement mixes shall not require hot weather verification for design mix approval. Use only design mixes approved by the SMO for Department use. Ensure that the 28-day strength (or strength at any other designated age) of all trial mixes meets the over design requirements to ensure that concrete sampled and tested at the point of placement has a strength exceeding the specified minimum strength.



FDOT Concrete Production Facilities Guide

Concrete trial mix temperature of 94°F (hot weather mixes):

- (1) Ensure that preparation and testing of the trial mixes is performed in accordance with ASTM C192, with the following exceptions:
- (2) Initial mixing shall be done in accordance with ASTM C192, except concrete materials shall be brought to a temperature that will ensure the mix temperature is not less than 94°F at any time.
- (3) Hold the trial mix in the mixer for 90 minutes after completion of initial mixing. During the extended mixing period, turn the drum intermittently for 30 seconds every five minutes. Cover the drum with wet burlap or an impermeable cover material during the rest periods. At the end of the 90-minute period, remix the trial mix for a minimum of one minute and make a slump test to verify that the concrete is within the specified range for slump. Ensure that the mix temperature is not less than 94°F at any time.
- (4) On completion of the extended mixing period, ensure that the trial mix concrete has a slump within ±0.75 inch of the target value (±1.0 inch for mixes utilizing a High Range Water-Reducing admixture), and an air content less than or equal to 6.0 percent. If below the target range, the producer may adjust the slump by a water addition. After the water addition, remix the concrete for a minimum of two minutes and perform slump and air content tests.
- (5) The total water used in initial mixing and the final slump adjustment constitutes the design mix water content. Perform water to cementitious ratio calculations in accordance with FM 5-501. Ensure that the total water to cementitious materials ratio does not exceed the maximum water to cementitious materials ratio in the Specifications Section 346, for the respective class of concrete.



FDOT Concrete Production Facilities Guide

Hot Weather concrete trial mix for extended transit time mixes:

Ensure that preparation and testing of the trial mixes are performed in accordance with the hot weather procedure, with the following additional requirements.

Upon completion of the hot weather procedure, no additional water shall be added to the batch. Hold the trial mix in the mixer for the additional time required after completion of the 90 minute mixing period. During the extended mixing period, turn the drum intermittently for 30 seconds every five minutes. Cover the drum with wet burlap or an impermeable cover material during the rest periods. At the end of the required additional time extension period, remix the trial mix for a minimum of one minute and perform a slump test to verify that the concrete is within the specified range for slump. Ensure that the mix temperature is not less than 94°F at any time.



Mixture Proportions

			CONCRE	TE MIX DESIGN				
Class: <u>}</u> FDOT Approval L Status: <u>API</u> Producer : <u>Cer</u>	PROVE	ED	Slip Form?: No		Minimum S Sean Masters PE 10-008 & 10-007 Only		h: <u>85(</u>	<u>00 psi</u>
Product Product Name	Quan	tity	Producer Plant #		QPL # Spec:	SSD	FM	Geological Type
Cement: Type II Cement	750	LB	CEMEX BROOKSVILLE S CMT08		AASHTO M 85 - Type II	3.15		
Fly Ash: Class F Fly Ash	175	LB	SEPARATION TECHNOL FA30		ASTM C 618 - Class F	2.48		
Coarse Aggregate: # 67 Stone	1725	LB	CEMEX 12008			2.50		Limestone
Fine Aggregate: Silica Sand	972	LB	CEMEX 16078			2.63	2.28	Silica Sand
Air Ent Admixture: Darex AEA	1.0	ΟZ	W R GRACE CO	,	S924-0002 AASHTO M 154 - AEA			
Type F Admixture: ADVA Cast 600				,	S924-0575 AASHTO M 194 - Type F			
Type D Admixture: Recover	15.0	ΟZ	W R GRACE CO	,	S924-0332 AASHTO M 194 - Type D			
Water: Water for Concrete	34.00	GA						
Water: Water for Concrete	283.2	LB						

	Spe		Producer Data			
Slump (Target Slump: 7 I		5.50 to 8.50	inches	W/C Ratio	0.31	LB per LB
Air Content	,	1.00 to 5.00	percent	Theoretical Yield	27.00	CF
W/C Ratio		Less than or equal to 0.31	LB per LB	Temperature	97	degree F
Temperature		Less than or equal to 100	degree F	Slump	7.75	inches
Compressive Strength	avgpsi	Density	144.6	LBperCF		
Aggregate Correction Fac		Chloride Content	0.135	LB per CY		
Comments:	<u></u>		Air Content	2.70	percent	
		Agg Corr Factor	0.6	percent		
Design approved by star	ndard deviation-F		28 DAY	9600	avgpsi	

2% air used to achieve Theo. of 27cf Plant 10-008 Standard Deviation of: 447 psi

Plant 10-007 Standard Deviation of: 669 psi



Keys to Successful Production

- Communication/Cooperation
- Specification
- Workability Retaining Admixtures
- Hydration Control Admixtures
- Chilled Water
- Experience













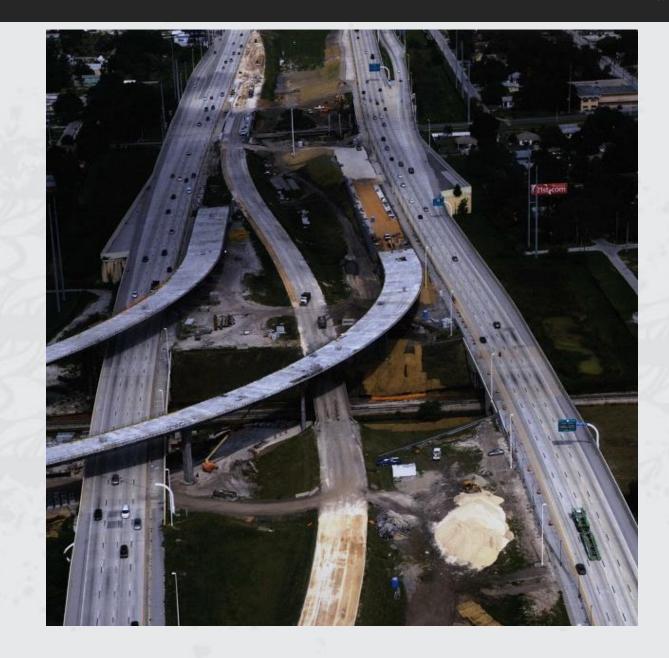








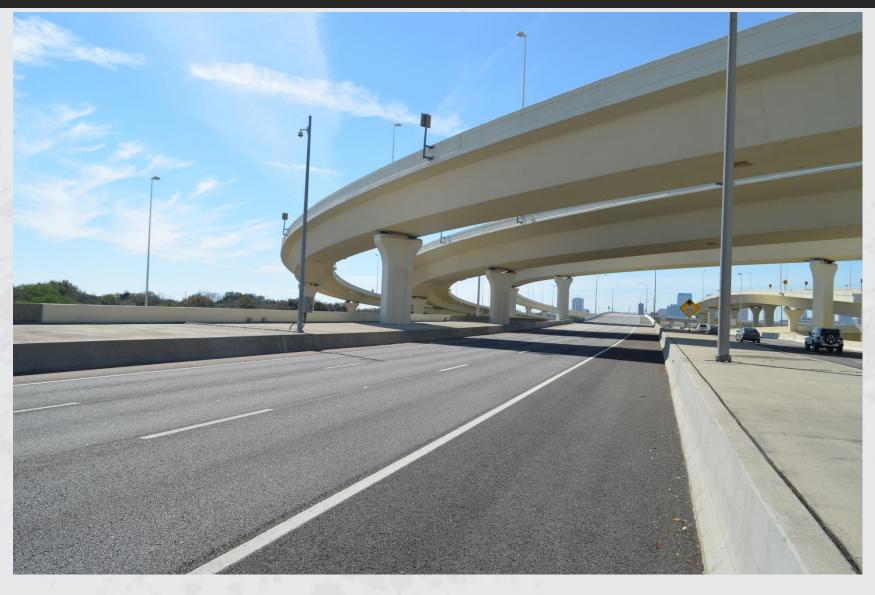








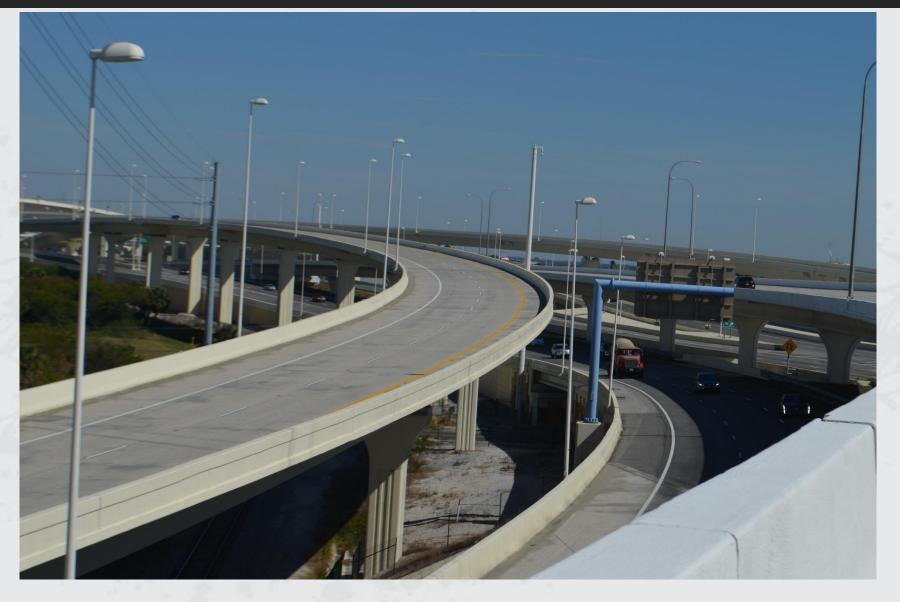








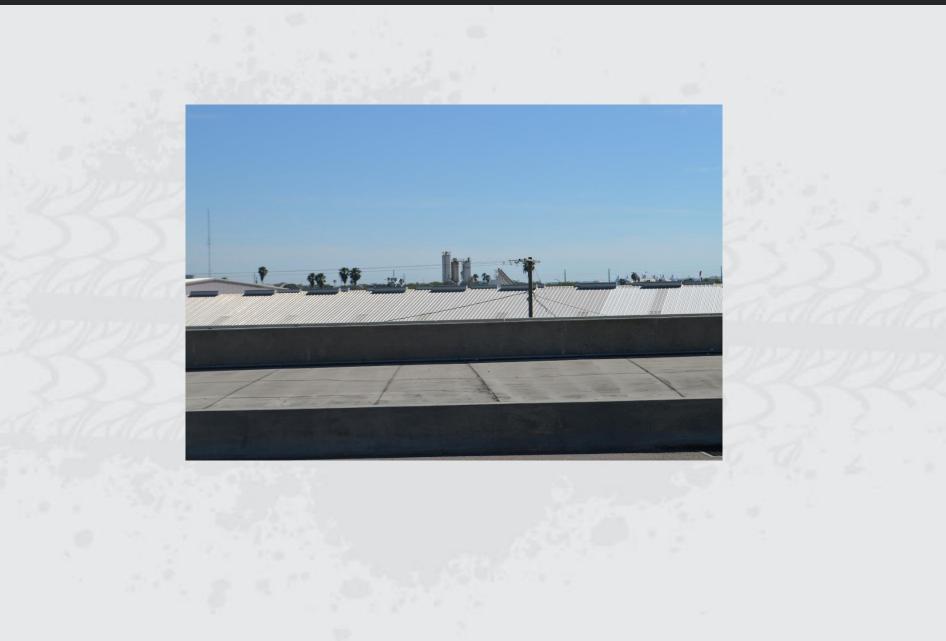














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